

SHIP PRODUCTION COMMITTEE
FACILITIES AND ENVIRONMENTAL EFFECTS
SURFACE PREPARATION AND COATINGS
DESIGN/PRODUCTION INTEGRATION
HUMAN RESOURCE INNOVATION
MARINE INDUSTRY STANDARDS
WELDING
INDUSTRIAL ENGINEERING
EDUCATION AND TRAINING

June 1978
NSRP 0005

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

REAPS 5th Annual Technical Symposium Proceedings

Paper No. 7: Computer-Aided Design Systems Applied to Ship Piping Design

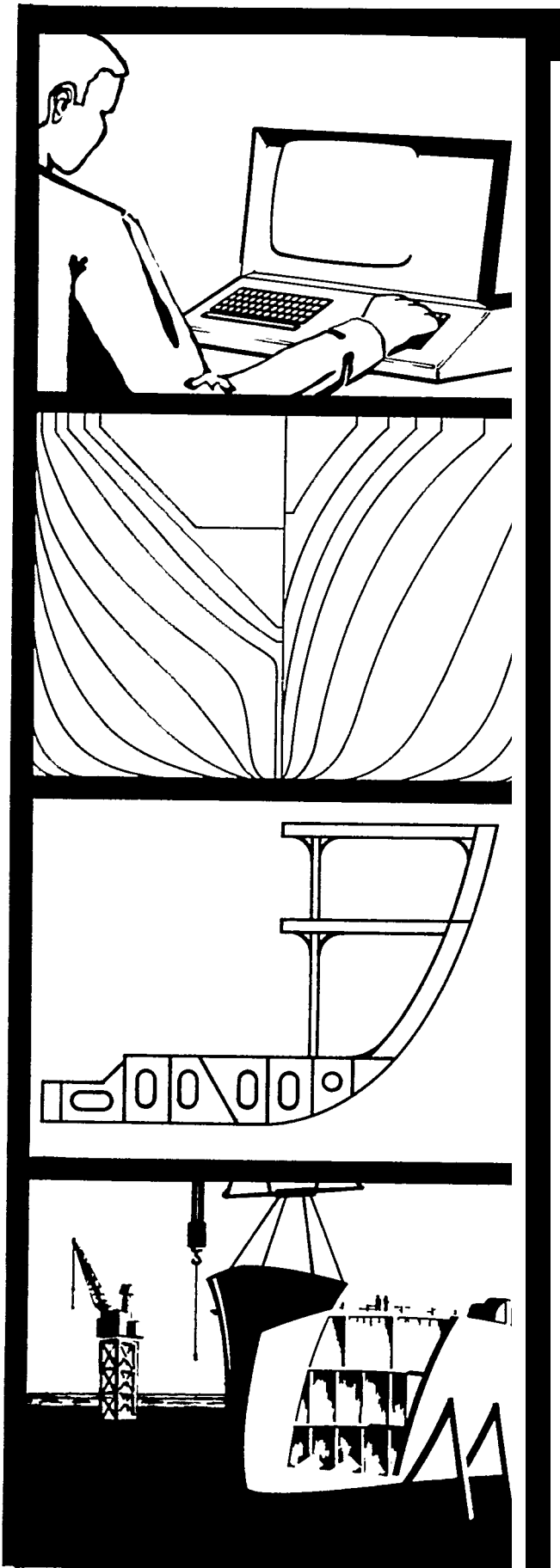
U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE JUN 1978		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE The National Shipbuilding Research Program REAPS 5th Annual Technical Symposium Proceedings Paper No. 7: Computer-Aided Design Systems Applied to Ship Piping Design				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Surface Warfare Center CD Code 2230 - Design Integration Tools Building 192 Room 128 9500 MacArthur Blvd Bethesda, MD 20817-5700				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 11	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

NSRP-0005

R ESEARCH
E AND
A NGINEERING
P FOR
S UTOMATION
AND
RODUCTIVITY
IN
HIPBUILDING

Proceedings of the
REAPS Technical Symposium
June 27-28, 1978
St. Louis, Missouri



DISCLAIMER

These reports were prepared as an account of government-sponsored work. Neither the United States, nor the United States Navy, nor any person acting on behalf of the United States Navy (A) makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness or usefulness of the information contained in this report/manual, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or (B) assumes any liabilities with respect to the use of or for damages resulting from the use of any information, apparatus, method, or process disclosed in the report. As used in the above, "Persons acting on behalf of the United States Navy" includes any employee, contractor, or subcontractor to the contractor of the United States Navy to the extent that such employee, contractor, or subcontractor to the contractor prepares, handles, or distributes, or provides access to any information pursuant to his employment or contract or subcontract to the contractor with the United States Navy. ANY POSSIBLE IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR PURPOSE ARE SPECIFICALLY DISCLAIMED.

Arnold G. Reinhold
Computervision Corporation
Bedford, Massachusetts

Mr. Reinhold is Product Line Manager, Civil Engineering and Mapping Systems at Computervision. He is product line manager for computer graphics systems for architecture, piping and cartography. Mr. Reinhold has 7 years of experience in programming and software management, primarily in computer graphics.

He has a B.S. degree in mathematics from City College of New York, an A.B.D. in mathematics from M.I.T., and a M.B.A. from Harvard.

THREE GENERATIONS OF COMPUTER ASSIST TO PIPING

BATCH SYSTEMS

INTERACTIVE DRAFTING SYSTEMS

INTERACTIVE DESIGN SYSTEMS

CHARACTERISTICS OF BATCH SYSTEMS

RECORD INPUT

CUMBERSOME EDITING

PIPING DATABASE

INFLEXIBLE OUTPUT

CHARACTERISTICS OF INTERACTIVE DRAFTING

EASY EDITING

ARCHIVE QUALITY PLOTS

LINES-ON-PAPER DATABASE

LIMITED DATA CAPTURE

LIMITED 3-D CAPABILITY

CHARACTERISTICS OF INTERACTIVE DESIGN

- BEST OF BOTH -

EASY EDITING

TRUE 3-D

GENERALIZED DATABASE

OUTPUT REPORT LANGUAGE

DESIGN RULES CHECKING

MULTI - APPLICATION

INTERFACE TO OTHER SYSTEMS

GENERALIZED DATABASE IS KEY TO GROWTH

GRAPHICAL DATA

NON-GRAPHICAL DATA

USER-DEFINED DATA

DATA INDEPENDENCE

DATA EXTRACTION

3-D DESIGN PROCESS

STRUCTURE, COMPARTMENTALIZATION

MAJOR EQUIPMENT LOCATION

RUN LINES BASED ON SYSTEM SCHEMATIC

INSERT COMPONENTS

OUTPUTS FROM INTERACTIVE DESIGN SYSTEM

ARCHIVE QUALITY DRAWINGS

BILLS OF MATERIAL

FROM-TO LISTS

ISOMETRIC, ORTHOGRAPHY C, AND DETAIL PLOTS

MASS PROPERTIES

DATA FOR OTHER SYSTEMS

USER DEFINED REPORTS

OTHER COMPUTER SYSTEMS THAT CAN USE
DATA FROM INTERACTIVE DESIGN

BATCH PIPING

INTERFERENCE ANALYSIS

STRESS ANALYSIS

SIMULATION

MASS PROPERTIES ACCOUNTING

FINITE ELEMENT ANALYSIS

MULTI -APPLI CATI ON-ADVANTAGES

PURCHASE ECONOMY

SHI FTI NG WORKLOAD

UNI FI ED DATABASE

EASI ER TRAI NI NG

MULTI -APPLI CATI ON-EXAMPLES

P I P I N G

WI RI NG DI AGRAMS

MECHANI CAL DESI GN

S T R U C T U R A L

NUMERI CAL CONTROL

FINI TE ELEMENT MODELING

TECHNI CAL ILLUSTRATION

P A R T N E S T I N G

OFF-THE-SHELF VS CUSTOM BUILT SYSTEMS

ADVANTAGES OF OFF-THE-SHELF SYSTEMS

LOWER COST

READY AVAILABILITY

SUPPORT AND DEVELOPMENT

WIDE USER BASE

DISADVANTAGES

DOESN'T DO EXACTLY WHAT YOU WANT

SOLUTION

USER ADAPTABLE SYSTEMS

CONCLUSION

OFF-THE-SHELF THIRD GENERATION INTERACTIVE

DESIGN SYSTEMS ARE THE RIGHT STARTING POINT

FOR AUTOMATING THE SHIP PIPING DESIGN PROCESS

Additional copies of this report can be obtained from the
National Shipbuilding Research and Documentation Center:

<http://www.nsnet.com/docctr/>

Documentation Center
The University of Michigan
Transportation Research Institute
Marine Systems Division
2901 Baxter Road
Ann Arbor, MI 48109-2150

Phone: 734-763-2465
Fax: 734-763-4862
E-mail: Doc.Center@umich.edu